National Institute of Environmental Health Sciences

Tick-Borne encephalitis transmission risk: Its dependence on host population dynamics and climate effects

Author(s): Palo RT
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Abstract:

Tick-borne encephalitis (TBE) is a human disease caused by a flavivirus that is spread by ticks (Ixodes ricinus). In 2011 and 2012, the highest TBE incidence ever was recorded in Sweden. It has been proposed that warmer spring temperatures result in higher survival of ticks and thus high incidence of TBE. Here, analyses were done of time series of TBE for 1976-2011 in relation to the North Atlantic Oscillation (NAO), mean summer temperatures, and yearly number of harvested European hare (Lepus europeaus), roe deer (Capreolus capreolus), and red fox (Vulpes vulpes) in the County of Stockholm, the area with most TBE cases in recent years in Sweden. The results show that the winter NAO index or winter temperature has no significant effect on the variation in wildlife numbers harvested or TBE cases over time. Mean summer temperature above 12 degrees C had a slight effect, but a multivariate model revealed that only the numbers of European hare and red fox remained in the model and explained 64.4% of the variation in TBE cases. Ticks do not seem to be as sensitive to climate variations as anticipated, even though that summer temperature has increased by 2 degrees C during the time period studied here. Instead, TBE cases seem to be more dependent on host population dynamics than on climate factors.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Temperature, Other Exposure

Temperature: Fluctuations

Other Exposure: North Atlantic Oscillation (NAO)

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Sweden

Health Impact:

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Tick-borne Disease

Tick-borne Disease: Tick-borne Encephalitis

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified